REMARKS

Claims 1-23 are pending in the present application. Claims 1, 10, 17, and 21 have been amended as set forth above. Claims 9 and 20 have been cancelled without prejudice or disclaimer to the subject matter therein. It is respectfully submitted that the pending claims define allowable subject matter.

Claims 1, 9, 10, 12, 16, 17, and 21 were rejected under 35 U.S.C. § 102 as being unpatentable over United States Patent No. 6,117,082 ("Bradley"). Claims 2-8, 11, 13-16, 18, 19, 22 and 23 were rejected under 35 U.S.C § 103 as being unpatentable over Bradley in view of United States Patent No. 6,193,663 ("Napolitano"). The Applicants respectfully traverse the rejections for the reasons set forth below.

The Applicants first turn to the rejection of claims 1, 10, 12, 16, 17, and 21 as being anticipated by Bradley. As discussed in Column 1, line 61 to Column 2, line 5 of Bradley, the embodiments disclosed therein include a low level subharmonic "seed" in a transmit waveform. The seed acts to nucleate the growth of the subharmonic distortion component, which increases the efficiency of the process of subharmonic generation. This in turn provides an improvement in the subharmonic signal level of imaging bandwidth.

Bradley discloses use of weighting factors having opposite polarities in order *to cancel a component* of the receive signal. At Column 13, lines 6-11, Bradley states:

> [T]he phases of the seed components S, S' are selected such that the fractional harmonic components of the receive signals *R1, R2 are approximately 180° out of phase.* When the receive signals R1, R2 are combined with opposite polarity weighting factors, the *fundamental components of the receive beams tend to cancel* while the fractional components of the receive beams R1, R2 tend to add... (emphasis added).

Likewise, Bradley, at Column 13, lines 50-54, discloses an embodiment in which opposite polarity weighting factors cancel the seed components of the receive signal:

> Note that opposite polarity summing weights are used such that linear echoes of *the seed components are cancelled* from the combined signal C1 that is applied in step 110 to an image processor. (emphasis added).

While Bradley discloses use of weighting factors *to cancel* fundamental components of the receive signal (while the fractional components tend to add), Bradley does not teach, nor suggest, using weighting factors to *sum the receive echoes along the entire scan line.*

The Applicants have amended claim 1 to recite "multiplying said first and second echoes with at least one weighting factor to form first and second weighted echoes; and summing said first and second weighted echoes along said entire scan line to form a composite scan line in an ultrasound image." Because Bradley does not teach, nor suggest, "multiplying said first and second echoes with at least one weight factor to form first and second weighted echoes; and summing said first and second weighted echoes along said entire scan line to form a composite scan line in an ultrasound image," Bradley does not anticipate claim 1 of the present application under 35 U.S.C. § 102. Thus, the Applicants respectfully submit that claim 1 should be in condition for allowance. .

With respect to claims 10 and 12, the Applicants note that claims 10 and 12 depend from claim 1 and include all limitations of claim 1. Because Bradley does not teach, nor suggest, all the limitations of amended claim 1, the Applicants respectfully submit that these claims are in condition for allowance.

Further, with respect to claims 10 and 16, Bradley does not disclose "weighting factor equals 1/N, wherein N is equal to a number of ultrasound beams transmitted along a common scan line in said transmitting step." Thus, in addition to the reasons set forth above, these claims should be in condition for allowance.

The Applicants have amended claim 17 to recite "multiplying said plurality of first echoes and said plurality of second echoes with at least one weighting factor to form a first plurality of weighted echoes and a second plurality of weighted echoes; and summing said first and second pluralities of weighted echoes along said entire scan line." For the reasons set forth above with respect to claim 1, the Applicants respectfully submit that Bradley does not anticipate claim 17. Thus, claim 17 should be in condition for allowance.

Further, with respect to claim 21 as amended, the Applicants note that claim 21 depends from claim 17, and includes all the limitations of claim 17. Because Bradley does not teach, nor suggest, all the limitations of amended claim 17, the Applicants respectfully that claim 21 should be in condition for allowance. Further, Bradley does not teach, nor

suggest "at least one weighting factor equals 1/N, wherein N is equal to a number of ultrasound beams transmitted along a common scan line in said transmitting step," as recited in claim 21.

The Applicants now turn to the rejection of claims 2-8, 11, 18, 19, 22, and 23 under 35 U.S.C. § 103(a) as being unpatentable over Bradley in view of Napolitano. As an initial matter, the Applicants note that claims 2-8 and 11 depend from claim 1, while claims 18-19 and 22-23 depend from claim 17. Because claims 1 and 17 should be in condition for allowance, as discussed above, the claims that depend from claims 1 and 17 should also be in condition for allowance.

Napolitano, as discussed in its Abstract, discloses a medical diagnostic ultrasonic imaging system that acquires receive beams from spatially distinct transmit beams. The receive beams alternate in type between at least first and second types across the region being imaged. The first and second types of receive beams differ in at least one scan parameter other than transmit and receive line geometry, including transmit phase, transmit or receive aperture, system frequency, transmit focus, complex phase angle, transmit code, or transmit gain. Receive beams associated with spatially distinct transmit beams are then combined.

Napolitano, however, does not teach, nor suggest "multiplying said first and second echoes with at least one weighting factor to form first and second weighted echoes; and summing said first and second weighted echoes along said entire scan line to form a composite scan line in an ultrasound image," as recited, for example, in claim 1. Napolitano is principally directed toward a system for acquiring receive beams from spatially distinct transmit beams (Abstract). At Column 11, lines 3-27, Napolitano discloses using weighting factors in relation to combining signals when "the transmit power or gain is alternated from scan line to scan line." This embodiment does not disclose weighting factors for echoes received along a *common* scan line, as claims 2-8 and 11 require. Moreover, the embodiments of Napolitano that discuss "spatially aligned" transmit beams, at Column 15, lines 1-10, do not teach, nor suggest, any use of weighting factors. Thus, Napolitano discloses weighting factors in relation to spatially distinct transmit beams, but does not teach, nor suggest, weighting factors in relation to beams across a common scan line. Overall, neither Bradley, nor Napolitano, alone, or in

combination with one another, teach or suggest "multiplying said first and second echoes with at least one weighting factor to form first and second weighted echoes; and summing said first and second weighted echoes–along said entire scan line to form a composite scan line in an ultrasound image," as recited, for example, in claim 1.
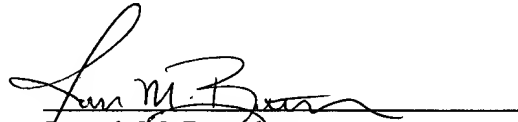
With respect to claim 13, Napolitano, at Column 9, lines 17-18, discloses embodiments wherein different focus depths are used in relation to different scan lines: "In these embodiments the location of the transmit focus is alternated across scan lines." However, neither Bradley, nor Napolitano, alone or in combination with one another, teach or suggest first and second transmit beams fired *along a common scan line* and at predetermined different first and second focus depths along said entire scan line. Thus, in addition to the reasons set forth above, claim 13 should be in condition for allowance.

With respect to claims 14 and 15, neither Napolitano nor Bradley, alone or in combination with one another, teach or suggest "first and second ultrasound beams being generated with a different number of transducer elements corresponding to different first and second aperture sizes" with respect to a beam along a common scan line. At Column 7, line 67, Napolitano discloses "Alternating Line Aperture Embodiments." Further, at Column 8, lines 1-3, Napolitano states, "In the alternating line aperture embodiments of this invention, the transmit aperture, the receive aperture, or both can be alternated across scan lines." Because neither Bradley nor Napolitano teach or suggest "first and second ultrasound beams [that are transmitted along a common scan line into a region of interest] being generated with a different number of transducer elements corresponding to different first and second aperture sizes," as recited in claim 14, for example, the Applicants respectfully submit that claims 14 and 15 are not unpatentable over Bradley in view of Napolitano. Thus, claims 14 and 15 should be in condition for allowance.

For the reasons discussed above, neither Bradley's nor Napolitano's limited disclosure of weighting factors is pertinent to the weighting factors as recited in claim 16. In addition, neither Bradley nor Napolitano teach or suggest use of "a weighting factor equal to 1/N to form first and second weighted echoes, wherein N is equal to a number of ultrasound beams transmitted along a common scan line...." Thus, claim 16 should be in condition for allowance.

In light of the above, the Applicants request reconsideration of the rejections of the pending claims of the present application and look forward to working with the Examiner to resolve any remaining issues in the application. If the Examiner has any questions or the Applicants can be of any assistance, the Examiner is invited to contact the Applicants. The Commissioner is authorized to charge any necessary fees or credit any overpayment to USPTO Account GTC, No. 07-0845.

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